

DREDGE

5

San Marcos
Seamount

4080-3045 m

* All chemistry samples have XRD mineralogy done also.

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 72 x 28 x 13 Location: San Marcos Seamount
 Sample Id: D5-1 Weight: 10 kg Depth: 4080-5045

Mn Crust Description

Surface Texture: Smooth, but discolored

Mn Crust Thickness:

Min: 13 Max: 25 Ave: 24

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.	<u>10</u>	<u>17</u>	<u>13.5</u>	<u>Brown laminated</u>
2.	<u>3</u>	<u>20</u>	<u>16.5</u>	<u>Black massive/bubble</u>
3.				
4.				
5.				
6.				



D5-1

Comments and XRD Mineralogy:

Outer layer laminated, bubble
inner layer massive
at 5000 m below crust

ANALYSES

Subsample & Type	Analysis	Weight
<u>D5-1A, Bulk</u>	<u>CC, REE, Pt</u>	<u>~25 mm Thick</u>
	<u>Au, XRD</u>	
<u>D5-1B</u>	<u>CC, REE, Pt</u>	<u>~15 mm Thick, par</u>
<u>outer layer</u>	<u>Au, XRD</u>	<u>laminated, massive</u>
<u>D5-1C</u>	<u>CC, REE, Pt</u>	<u>6 mm thick, massive</u>
<u>inner layer</u>	<u>Au, XRD</u>	<u>black,</u>
		<u>Transition of brown to</u>
		<u>rich layer between Cu</u>
		<u>+ basaltic to iron -</u>
		<u>mat left out of 1A &</u>
		<u>1C</u>
<u>D5-1D</u>	<u>ts, OC</u>	<u>hyssalt (altered)</u>

Substrate Description

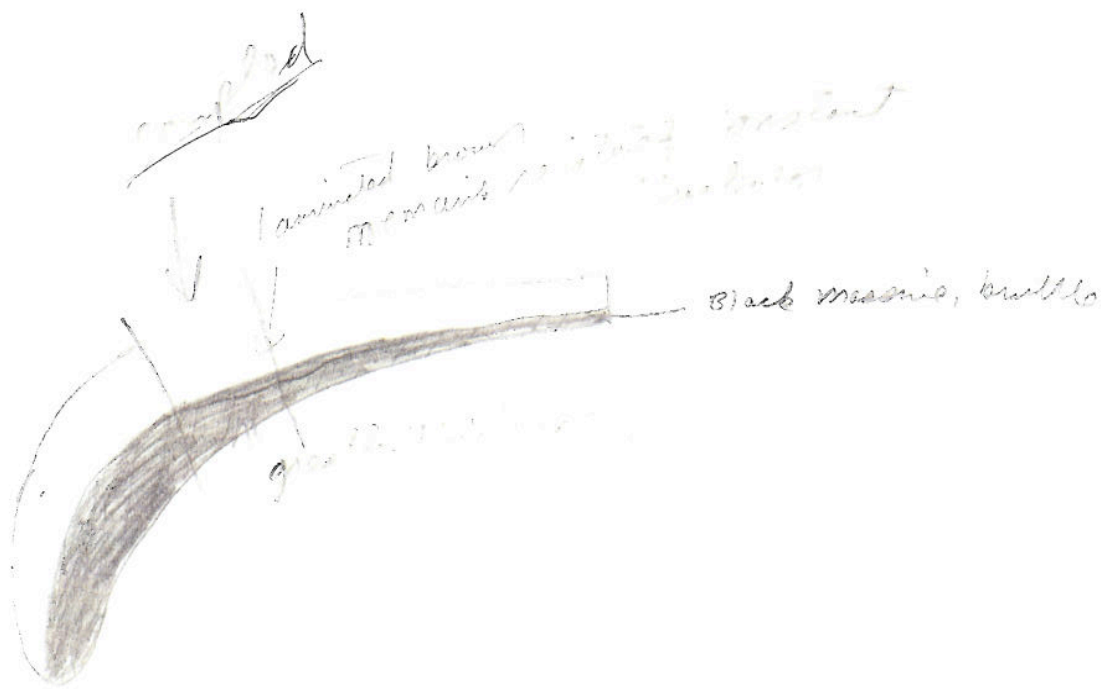
Rock Type: massive black basalt
at 5000 m below crust

Description:

Described By: dj

Subsampled By: LB D5-1A

↓
over



SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 2345 g Location: San Marcos Seamount
Sample Id: 05-2 Weight: 4 kg Depth: 4080-3045

Mn Crust Description

Surface Texture: Smooth, flange 0-2
bladed granule, 20-40 cycles

Mn Crust Thickness:

Min: 2 Max: 13 Ave: 8 mm

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:

Black mass 102

upst on 60

rock only.

225 of 200-400000

9.10.2015 4. of. Mal 2.

ANALY:

Subsample & Type

DS-2A bulk

Analysis

CC, 1911

Weight

10 mm Thick

Substrate Description

Rock Type: Vesicular Basalt

Description:

Bis to being aphoristic

around middle Common 1885

41 mm across across 1 ft.

with white mineral.

Black glassy surface rim 1cm

base *max* *dist.*

Keep an 'edge'

Described By:

Subsampled Dr.



D5-2

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 22x19x19 Location: San Marcos Seamount
 Sample Id: D5-3 Weight: 10 kg Depth: 4080-3045

Mn Crust Description

Surface Texture: smooth, one side w/
abundant coarse granular

Mn Crust Thickness:

Min: 7 Max: 20 Ave: 12

Layers (Outer to Inner):

Min	Max	Ave	Texture
1.			
2.			
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

many encrusting forams; phosphatic
fragments in crust; brown,
laminated; side = black
granular -

Substrate Description

Rock Type: Altered Basalt +
Basalt-crust breccia

Description:

Basalt (alteration) alteration veins
along fractures; tabular basalt
fragments + palagonite in crust
fragments cemented by micaceous
carbonate (cement supported)

some glass (sampled 10')



ANALYSES

Subsample & Type	Analysis	Weight
<u>D5-3A Bulk</u>	<u>CC</u>	<u>16 mm</u>
	<u>XRD</u>	
<u>D5-3B Bulk</u>	<u>TS</u>	<u>Breccia</u>
<u>D5-3C</u>	<u>XRD</u>	<u>Breccia matrix +</u> <u>palagonite</u>
<u>D5-3D</u>	<u>probe A. of glass (A.D.)</u>	
<u>D5-3E side</u>	<u>grain sample CC</u>	
<u>35mm slide</u>		<u>G. Smith</u>
<u>D5-3F</u>	<u>DPTS of Breccia sea rock - large</u>	
	<u>chips from CbF</u>	
<u>D5-3G</u>	<u>xEDSr, O₂</u>	
	<u>(Binoc. Polaroids)</u>	

Described By: D.J.

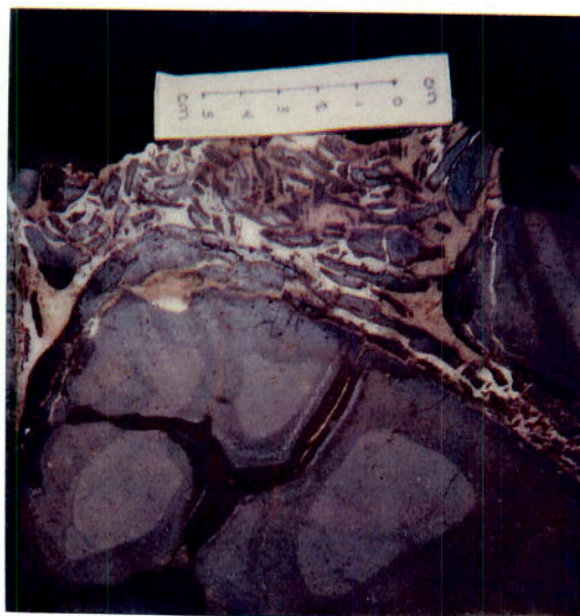
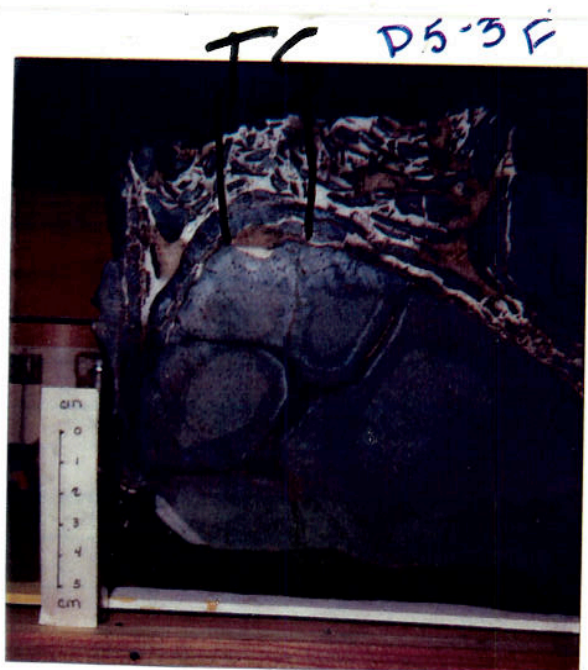
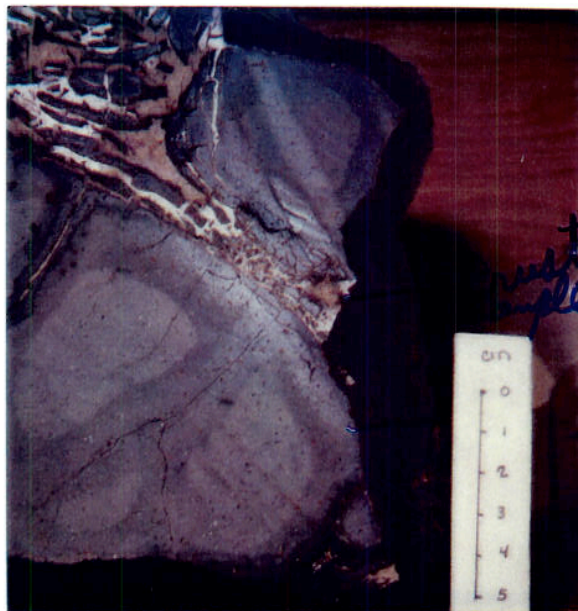
Subsampled By: D.J.

CHP



F7-87-SC
D5-8

D5-34
compact
xcp
out-2r



SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 14x15x8 Location: San Marcos
Sample Id: D5-4 Weight: 2 kg Depth: 4050-4045

Mn Crust Description

Surface Texture: Smooth, abraded?

Mn Crust Thickness:

Min: 1 Max: 15 Ave: 7 - laminated

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:

ANALYSES

Subsample & Type

Analysis

Weight

Substrate Description

Rock Type: Olivine, felds, phos

Description:

Described By:

Subsampled By:



D5-4

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 135x8x8 cm Location: San Marcos
Sample Id: D5-5 Weight: 1.5 kg Depth: 4080 - 3045

Mn Crust Description

Surface Texture: Smooth to granular

Mn Crust Thickness:

Min: 2 mm Max: 10 mm Ave: 5.5 mm

Layers (Outer to Inner):

Min	Max	Ave	Texture
1.		7mm	Resinous
2.		3mm	Resinous
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

Fe-stained layer between crust layers

Small sides but one possible
sitting on bottom where no crush

2 pieces fit together, to make one cobble

Substrate Description

Rock Type: Basalt

Description:

slightly vesicular group

ANALYSES

[illegible]

D5-5

Described By:

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 8 × 9 × 6 Location: San Marcos
Sample Id: D5-6 Weight: 0.5 kg Depth: _____

Mn Crust Description

Surface Texture: Smooth, granular on
side

Mn Crust Thickness:

Min: 7 Max: 28 Ave: 13

Layers (Outer to Inner):

Min	Max	Ave	Texture
1.			Laminated
2.			
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

This phosphate forms between
basalt & crust

ANALYSES

[illegible]

Substrate Description

Rock Type: Basalt

Description:

Described By: D.J.

Subsampled Bv: 0.3 ..



SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 80x52x5 Location: San Marcos
Sample Id: D5-7 Weight: _____ Depth: 2000 2115

Mn Crust Description

Surface Texture: smooth to granular

Mn Crust Thickness:

Min: _____ Max: 10mm Ave: 5.5

Layers (Outer to Inner):

Min	Max	Ave	Texture
1.	6		massive
2.	4		massive
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

Patch of mud on the outside

Substrate Description

Rock Type: Basalt

Description:

Regular Grey slightly with some small
dots



DS-7

ANALYSES.

[illegible]

Described By: J. W.

Subsampled Bv:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 15x95x9 cm Location: San Marcos

Sample Id: D5-8 Weight: _____ Depth: 1320-1325

Mn Crust Description

Surface Texture: Smooth to Grooved (?)

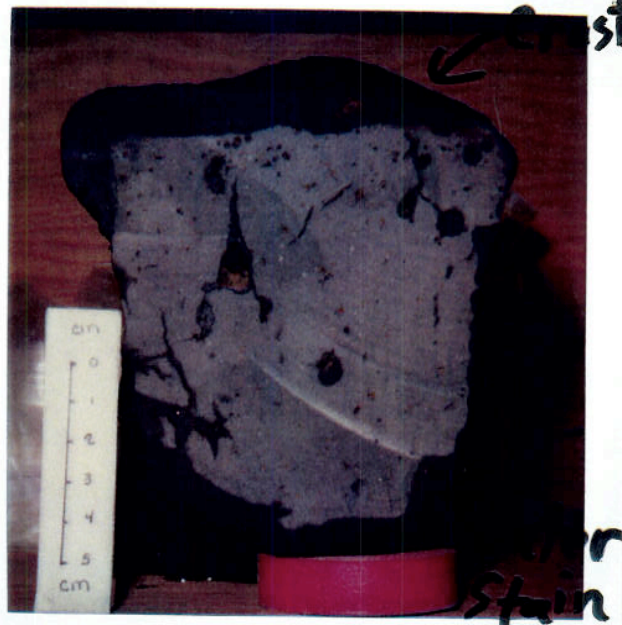
smooth to eroded (?) botryoidal

Mn Crust Thickness:

Min: 12 Max: 5 Ave: 7

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				



Comments and XRD Mineralogy:

encrusting forams on surface

ANALYSES

[illegible]

Substrate Description

Rock Type: basalt

Description:

Greenberg's

Green Grey fairly fresh looking w lots of small phenocryst

Described By: JSM

Subsampled Bv:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 7.5 x 6 x 6 cm Location: San Jose

Sample Id: 1009 Weight: 0.3 kg Depth: 1050 - 1100

Mn Crust Description

Surface Texture: smooth, shiny

Mn Crust Thickness:

Min: _____ Max: _____ Ave: _____

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:

ANALYSES

[illegible]

Substrate Description

Rock Type: Basaltic Andesite

Description:

100% a. quartz - calcite
 clasts and the basalt but there are
 a few basaltic glass clasts

Described By: 

Subsampled By:



D5-19

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 12X12X12 Location: San Marcos

Sample Id: D5-10 Weight: _____ Depth: 4080 - 3016

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 1 Max: 5 Ave: 3

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				



Comments and XRD Mineralogy:

Orange colored on the following pages

Orange colored material between basalt + substrate

Substrate Description

Rock Type: basalt

Description:

Basaltic glass on flow

Basaltic glass or very vitreous layer on top (?) of basalt

ANALYSES

D5-10

[illegible]

Described By:

Subsampled Bv:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 10x7.5x8 Location: San Marcos

Sample Id: D5-11 Weight: 1 kg Depth: 4080-3045

Mn Crust Description

Surface Texture: smooth to granular, slightly
botryoidal

Mn Crust Thickness:

Min: 1mm Max: 19mm Ave: 10mm

Layers (Outer to Inner):

Min	Max	Ave	Texture
1.			
2.			
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

Front laminae are visible

ANALYSES.

D5-11

[illegible]

Substrate Description

Rock Type: Basalt

Description:

Described By: JSM

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 12.5 x 8.5 x 5.5 cm Location: San Marcos
Sample Id: D5-12 Weight: 0.5 g Depth: 4080 - 3015

Mn Crust Description

Surface Texture: Smooth

Mn Crust Thickness:

Min: 2mm Max: 20mm Ave: 11mm

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				



D5-12

Comments and XRD Mineralogy:

Crust Thicker on Beccia End

~~Unconformity is good~~

ANALYSES

[illegible]

Substrate Description

Rock Type: Basalt Gabbro with Volcaniclastic Breccia at top and

Description:

From the following...

Described By:

Subsampled By:



D5-12

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 11 x 13 x 10 cm Location: San Marcos

Sample Id: D5-13 Weight: _____ Depth: 1000 - 800

Mn Crust Description

Surface Texture: fine to medium

11. Ch. 10

Mn Crust Thickness:

Min:_____ Max:_____ Ave:_____

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				



Comments and XRD Mineralogy:

ANALYSES

D5-13

Subsample & Type

Analysis

Weight

Substrate Description

Rock Type: Basalt

Description:

Fractured surface, rough, white
with black granular stain

Fractured surface glassy altering with tan (phosphorite) mud

Described By:

Subsampled Rv.

11 x 10.5 x 5 cm
13 x 7 x 10 cm

Mn Crust Description

Some have 200-1700 ft. in depth.

Mn Crust Thickness:

Min: 10 Max: 60 Ave: 35

Layers (Outer to Inner):

Min	Max	Ave	Texture
1.			
2.			
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

[illegible]

Various Basalt cobbles w/ crusts of varied thickness.
Some phosphorite layers. □

13 cobbles (more pieces because they are all cut)

Substrate Description

Rock Type: **Basalt**

Description:

1. New design of the car is very good.
2. The car is very good.
3. The car is very good.

ivory to yellow colored material (phosphorite?) on a few samples occurs between crust and basalt



D5-14

ANALYSES

[illegible]

Described By:

Subsampled Bv.

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 18 x 2.5 x 14cm Location: San Marcos

Sample Id: D5-15 Weight: 1Kg Depth: 4080-3045

Mn Crust Description

Surface Texture: Smooth to coarse

Mn Crust Thickness:

Min: 2 Max: 13 min Ave: 10 sec

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				



D5-15

Comments and XRD Mineralogy:

(20 x 13 cm) Clash R. *univ.*
 MnO_2 p's yellowish to red
 is a bit of bright blue
 and blackish MnO_2

(20x13mm) Clast of dendritic MnO₂ plus yellow/white sediment is glued to basalt frag in area of thickest MnO₂

Substrate Description

Rock Type: Basalt (Vesicular)

Description:

~~Bract Color: yellow w/o
very large~~

vesicular basalt with
common vesicles & minor scoriae.
Some white b'd por? in
vesicles.

ANALYS

Subsample & Type

Analysis

Weight

Basalt Cobble, angular w/ a very strange shape

- Vesicular basalt with common vesicles <1mm across. □ Some white sed PO4? in vesicles □

Described By:

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 18 x 12 x 13cm Location: San Marcos
Sample Id: D5-16 Weight: 2Kg Depth: 11060 - 3045

Mn Crust Description

Surface Texture: Smooth botrioids (< 7 mm up
to 20 mm across) on top; thick encrustations (< 7 mm)
& large (> 2 mm) granular MnO₂ in lows.

Mn Crust Thickness:

Min: 6 Max: 19 Ave: 9 mm

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.	3	15	6	massive, black
2.	3	4	3	poq with fragments of old crust around (floating in it. orange soil layer between poq & basal)
3.				
4.				
5.	2	7	6	granular MnO ₂ in lows.
6.				

Comments and XRD Mineralogy:

ANALYS

Subsample & Type

Analysis

Weight

Substrate Description

Rock Type: Basalt

Description:

* described as large, granular
 MnO_2 above.

Cooling fractures have created elongated hollows those
filled with dendritic *Mn need to be cut to see more
*described as large granular MnO₂ above

Described By:

Subsampled Bv:



D5-16

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 16x15x10cm Location: San Marcos

Sample Id: D5-17 Weight: 2 kg Depth: 1780 - 200

Mn Crust Description

Surface Texture: Smooth

the growth board. v. 1

Mn Crust Thickness:

Min: 4 min Max: 20 min Ave: 12 min

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:

All six pieces are equal in size

DATE

Substrate Description

Rock Type: Basalt

Description:

Glass Disc 41 to 10 mm thick
on the base. Above this is a piece
yellow brown, soft maybe altered volcanic
glass.

sampled for glass + piece
for bulb. chem. (A.D.) "

Described By: JGM

Subsampled By:



D5-17

Basalt
glass
yellow layer
crust



D5-17

SAMPLE DESCRIPTION

Bruise Id: F7-87-SC Size: 11.5 x 8.5 x 8 (cm) Location: San Marcos

Sample Id: D5-18 Weight: 1 kg (1 kg) Depth: 4050 - 3045 (m)

Mn Crust Description

Surface Texture: smooth to granular / Fe stain
eroded (?) laminae visible on face

Mn Crust Thickness: (in mm)

Min: 5.000 Max: 8.0 Ave: 6.500

Layers (Outer to Inner):

Min (mm)	Max (mm)	Ave (mm)	Texture, Color
----------	----------	----------	----------------

1.			
2.			
3.			
4.			
5.			
6.			

Comments and XRD Mineralogy:

ANALYSES

Subsample & Type

Analysis

thickness of layers sampled
and extension of
subsample location (if needed).

Substrate Description

Rock Type: Volcaniclastic Breccia

Description:

Small gas bubbles are located in the interface
between the wire and the metal.

Most rocks are grey basalt.

Described By: JEN

Subsampled By:



D5-18

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: 6.5x6x3 9x8x4.5 (cm) Location: San Marcos
 Sample Id: D5-19 Weight: 1 kg (kg) Depth: 1080 - 3045 (m)

Mn Crust Description

Surface Texture: Smooth on top, granular on the bottom

Mn Crust Thickness: (in mm)

Min: patina Max: 2 mm Ave: 1 mm

Layers (Outer to Inner):

	Min (mm)	Max (mm)	Ave (mm)	Texture, Color
1.				
2.				
3.				
4.				
5.				
6.				



D5-19

Comments and XRD Mineralogy:

Top surface of both samples fractured, very
 dusty, contains Mn(?) or other material in
 fractures. Two phosphatic(?) w/ Mn
 blebs on top of fractured zone. Reaction
 about phosphatized zone.
 Fractured surfaces may be glass. Almost
 low thick phosphatic. It's one sample.

ANALYSES

Subsample & Type

Analysis

thickness of layers measured
 and XRD analysis of
 subsample location (if needed).

Substrate Description

Rock Type: Basalt, grey, slightly irregular

Description:

Described By: JOIA

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F7-87-SC Size: _____ Location: San Marco

Sample Id: D5-20, 21, 22 Weight: _____ Depth: _____

Mn Crust Description and 23

Surface Texture: _____

Mn Crust Thickness:

Min: _____ Max: _____ Ave: _____

Layers (Outer to Inner):

	Min	Max	Ave	Texture
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:

ANALYSES

Subsample & Type

Analysis

Weight

D5-20

probe

Glass A.D.) + WR ch

25 21

4

25 22

4

DS-23

Substrate Description

Rock Type: _____

Description:

Described By:

Subsampled By: